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THE FRESNO KANGAROO RAT POPULATION SURVEY, 1977^{1/}

by

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ABSTRACT

Live-trapping was done from February to May, 1977, to obtain population estimates for the Fresno kangaroo rat (Dipodomys nitratoides exilis) on 67.5 ha of alkali sink habitat in western Fresno County. The study area was that used by Warner (1976)^{3/}, and included two sites of different grazing pressures. Population densities were found to be lower in 1977 than in 1976. Site 1, characterized by a change in grazing pressure from four to five horses and two cows in 1976 to no animals in 1977, showed a 23 percent reduction in number of Fresno kangaroo rats. Site 2, characterized by a change from no grazing for the previous two years in 1976 to heavy grazing by 40 sheep in 1977, showed a 72 percent reduction in Fresno kangaroo rats. The amount of precipitation and degree of grazing pressure were determined to be the significant factors affecting densities.

^{1/} Nongame Wildlife Investigations, Final Report, Project E-1-1, Job IV-1.1 (December, 1977).

^{2/} California State University, Fresno.

^{3/} Warner, D. R. 1976. The effects of grazing on Dipodomys nitratoides exilis in an alkali sink community. M.A. Thesis, Calif. St. Univ., Fresno, 91 pp.

RECOMMENDATIONS

In order to assure the continued existence of the Fresno kangaroo rat and its native habitat, the following recommendations are made:

1. Change the Fresno kangaroo rat population status rating from rare to endangered.
2. Acquire native habitat as an ecological reserve for the Fresno kangaroo rat and other organisms found in the alkali sink plant community type.
3. Locate the remaining alkali sink habitat in western Fresno County and determine the present distribution of the Fresno kangaroo rat.

INTRODUCTION

The Fresno kangaroo rat (Dipodomys nitratoides exilis) was first collected in 1891. It was presumed extinct until rediscovered in 1933 by Culbertson (1934). The Fresno kangaroo rat was declared to be a rare species by the California Fish and Game Commission on May 21, 1971 (Leach and Fisk, 1972). During 1972-1973, Hoffmann (1974) conducted a survey to determine the distribution and taxonomic status of the animal. Knapp (1975) determined the available habitat for the Fresno kangaroo rat and identified critical habitat. Warner (1976) evaluated the effects of grazing on the Fresno kangaroo rat in an alkali sink community.

Rapid disappearance of the alkali sink plant community and the threatened extinction of the Fresno kangaroo rat make it necessary to continue the effort to preserve a part of this ecosystem.

The objectives of this study were as follows: 1) to estimate the population of Fresno kangaroo rats on an alkali sink habitat in western Fresno County; and 2) to determine any further effects of grazing on Fresno kangaroo rat populations.

The study area was the one used by Warner (1976), and was located on Whitesbridge Road in the northwest quarter of Sec. 12, T 14 S, R 15 E, Tranquillity 7.5 - Min. Quad., Fresno County, California. The area is 67.5 ha of alkali sink plant community (Munz, 1973). A species list of vascular plants and vertebrates found on the area was developed by Warner (1976).

During Warner's work in 1976, the study area was divided by an existing fence into a grazed area of 53.5 ha and an ungrazed area of 14 ha (Figure 1). The grazed area (Site 1) was occupied by four to five horses and two cows, and the ungrazed area (Site 2) had not been occupied by livestock since 1974. An estimated 424 Fresno kangaroo rats (7.9/ha) were on Site 1, and an estimated 239 (17.1/ha) were on Site 2.

In the present study (1977), Site 1 no longer had any livestock grazing (and was termed "previously grazed"), and Site 2 had experienced heavy grazing by 40 sheep from September, 1976, through the completion of field work in May, 1977.

METHODS

On 11 nights from February to May, 1977, live-trapping was conducted for all small mammal species two to four nights per month on two square grids, each composed of 64 stations, eight stations on a side. Traps were 8 m apart, giving each trap an area of influence of about 4 m. One grid was randomly located in each of Sites 1 and 2. The area of influence of an entire trap-grid was calculated to be 0.41 ha. The number of Fresno kangaroo rats captured on each grid per month of study was averaged to arrive at a mean density/0.41 ha on each grid (Table 1). The mean figure for each grid was expanded to give an estimated number for the entire site.

In the actual trapping, one Sherman live trap was placed at each station and baited with rolled oats and bird seed. Traps were checked daily, and newly-captured animals were toe-clipped and released.

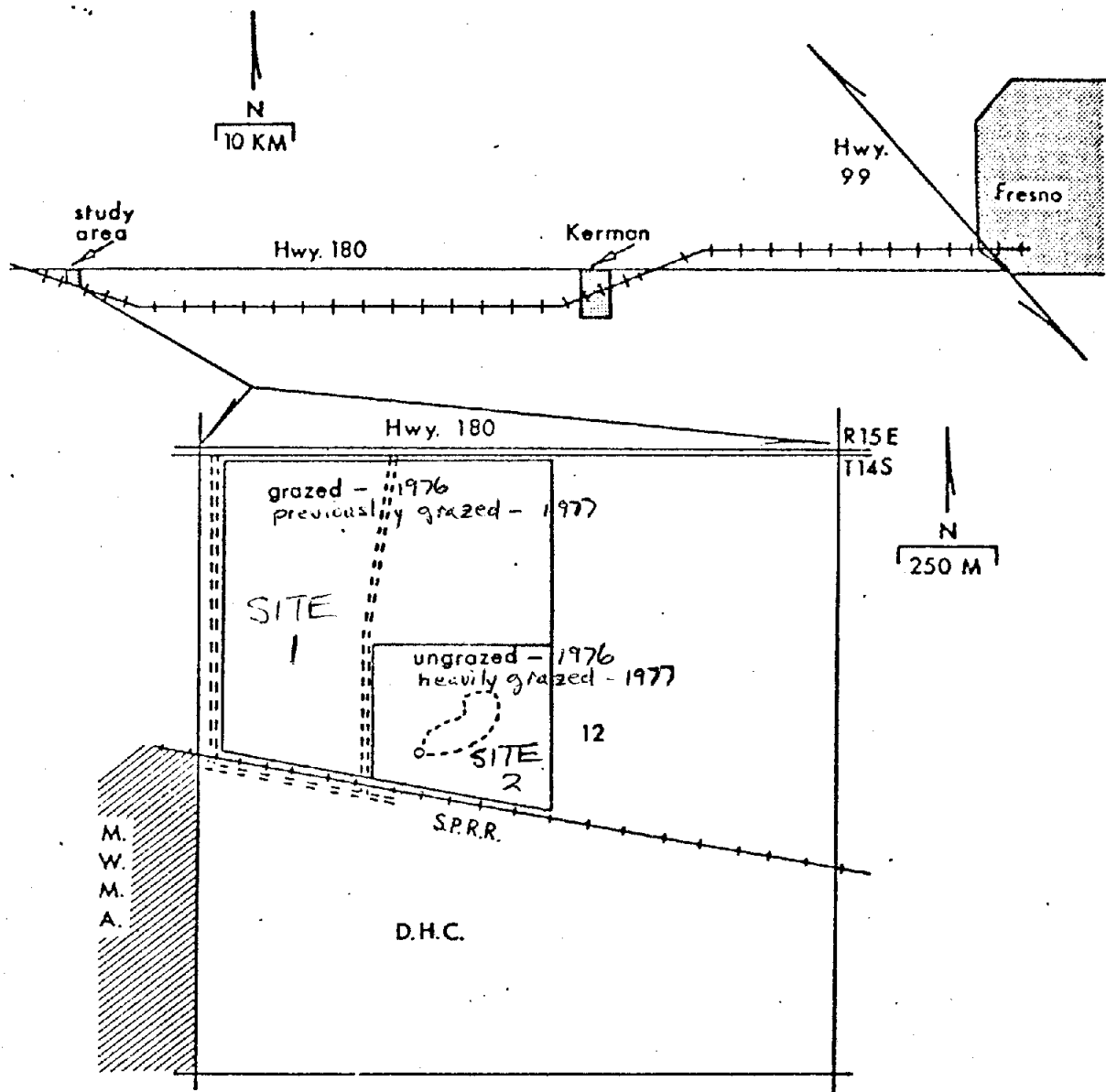


Fig. 1. Location of study area relative to the cities of Fresno and Kerman, Fresno County, California.

A vegetation analysis for percent ground coverage by the major plant taxa was conducted in May, 1977. Each grid was sampled, using six line transects of 30 m each.

RESULTS

Three species of small mammals were captured on Sites 1 and 2 from February to May, 1977. The estimated numbers of Fresno kangaroo rats on each grid and site are shown in Table 1. Population estimates for Heermann's kangaroo rat (Dipodomys heermanni) and deer mouse (Peromyscus maniculatus) are shown in Figures 2 and 3, respectively.

Vegetation analysis indicated a decrease in percent plant cover from 1976 to 1977, with the largest decrease in grasses and forbs (Figure 4).

Table 1. Estimated numbers of Fresno kangaroo rats on each grid and site in 1977.

<u>Dates</u>	<u>Site 1 - Previously Grazed</u>	<u>Site 2 - Heavily Grazed</u>
Feb. 19, 20	3.0/0.41 ha	4.0
Mar. 10, 11, 12, 13	2.0/0.41 ha	2.0
Apr. 28, 29	2.0/0.41 ha	1.0
May 24, 25, 26	<u>3.0/0.41 ha</u>	<u>1.0</u>
mean/0.41 ha	2.5	2.0
number/site	326	68

DISCUSSION

Comparison of Fresno kangaroo rat population estimates on Sites 1 and 2 for 1976 and 1977 shows lower population levels in 1977. This difference may possibly be attributed to the decreasing mean precipitation over the two years. Reynolds (1958) found that the amount of rainfall was the most important factor for Merriam's kangaroo rat population levels. Figure 5 shows the monthly rainfall for 1975, 1976 and 1977. The rainfall for that period was erratic and surely had an effect on the vegetative cover.

In this study, as in that of Warner (1976), the larger Fresno kangaroo rat population was associated with the least grazing pressure. In 1976, Site 1 was being grazed by four to five horses and two cows, and had an estimated 424 Fresno kangaroo rats (7.9/ha). In 1977, the site was no longer grazed, and the population had dropped 23 percent to an estimated 326 rats (6.1/ha). This decline may be related only to decreasing precipitation and the accompanying reduction in vegetation for food, particularly grasses and forbs. The probability is that both reduced rainfall and previous grazing pressure are the causes of less grasses and forbs, and thus fewer Fresno kangaroo rats.

A greater density of this subspecies was found on Site 2 in 1976 (17.1/ha) than on Site 1 (7.9/ha - 239 animals). Site 2 was ungrazed in 1976 and had not been grazed since 1974. This supports the theory that a denser population may exist

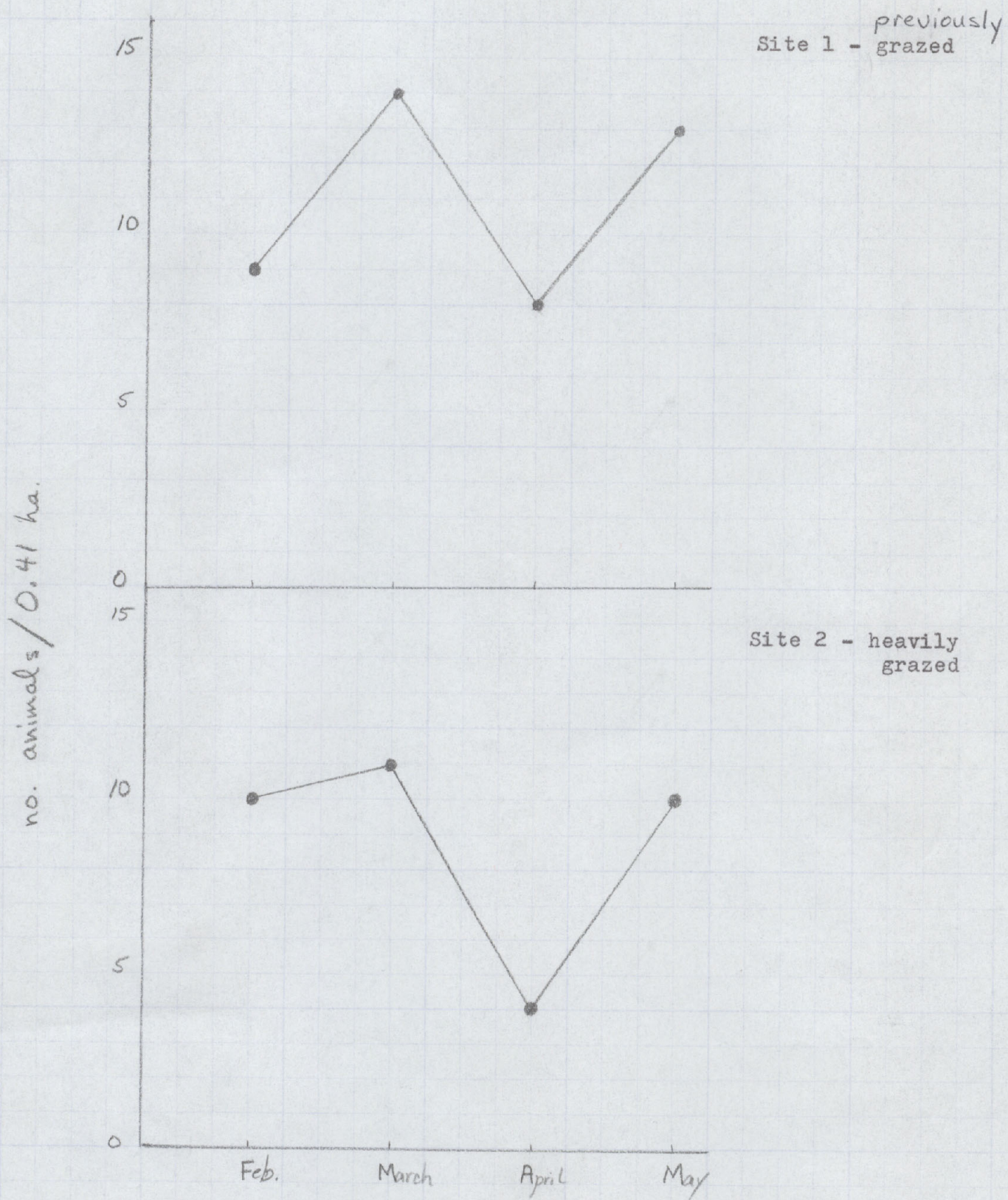


FIG. 2 - Population estimates for Dipodomys heermanni on both grids for 1977.

no. animals / 0.41 ha.

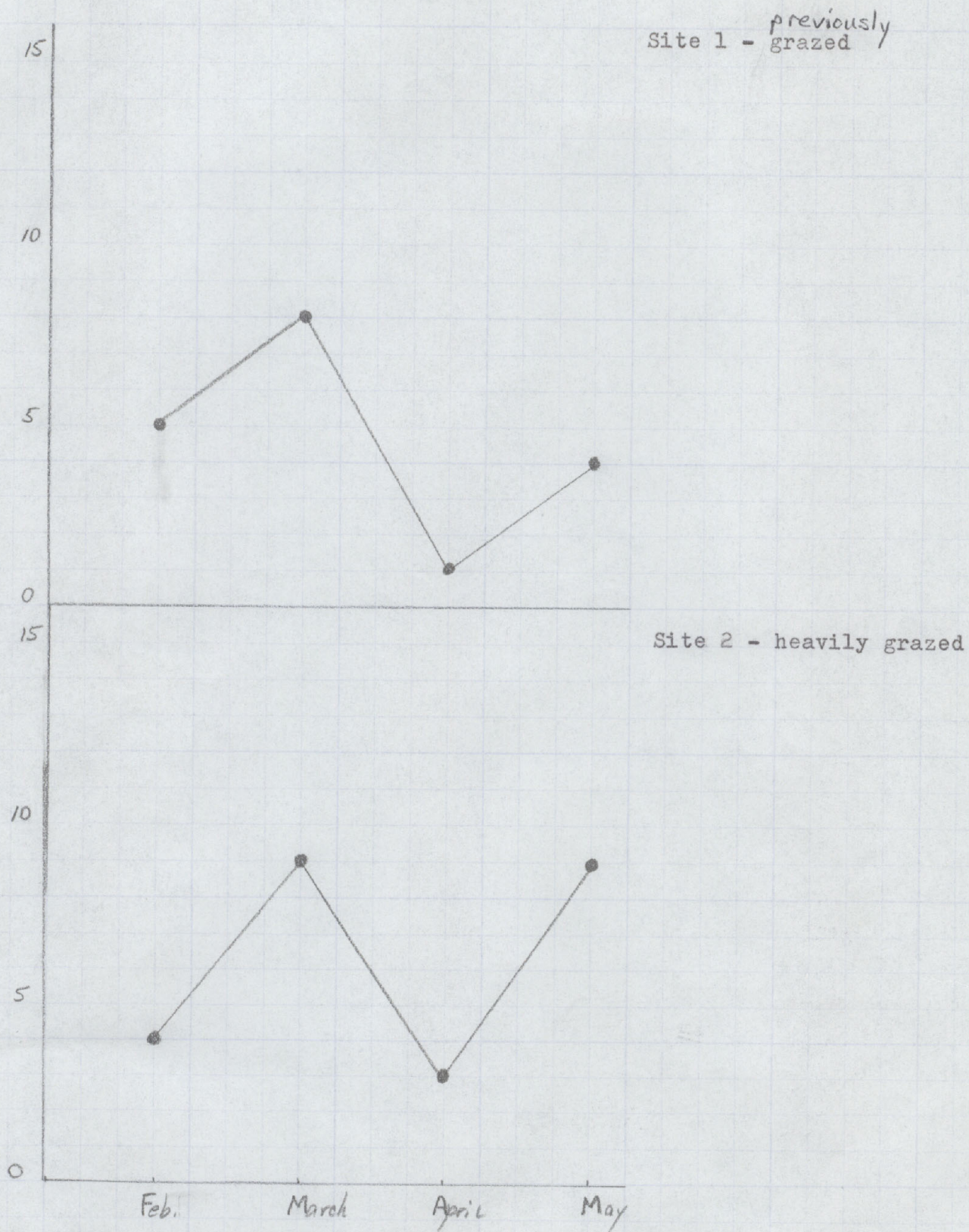


FIG. 3 - Population estimates for Peromyscus maniculatus on both grids for 1977, ~~_____~~

Fig. 4. Plant cover on both grids for 1975 and 1977.

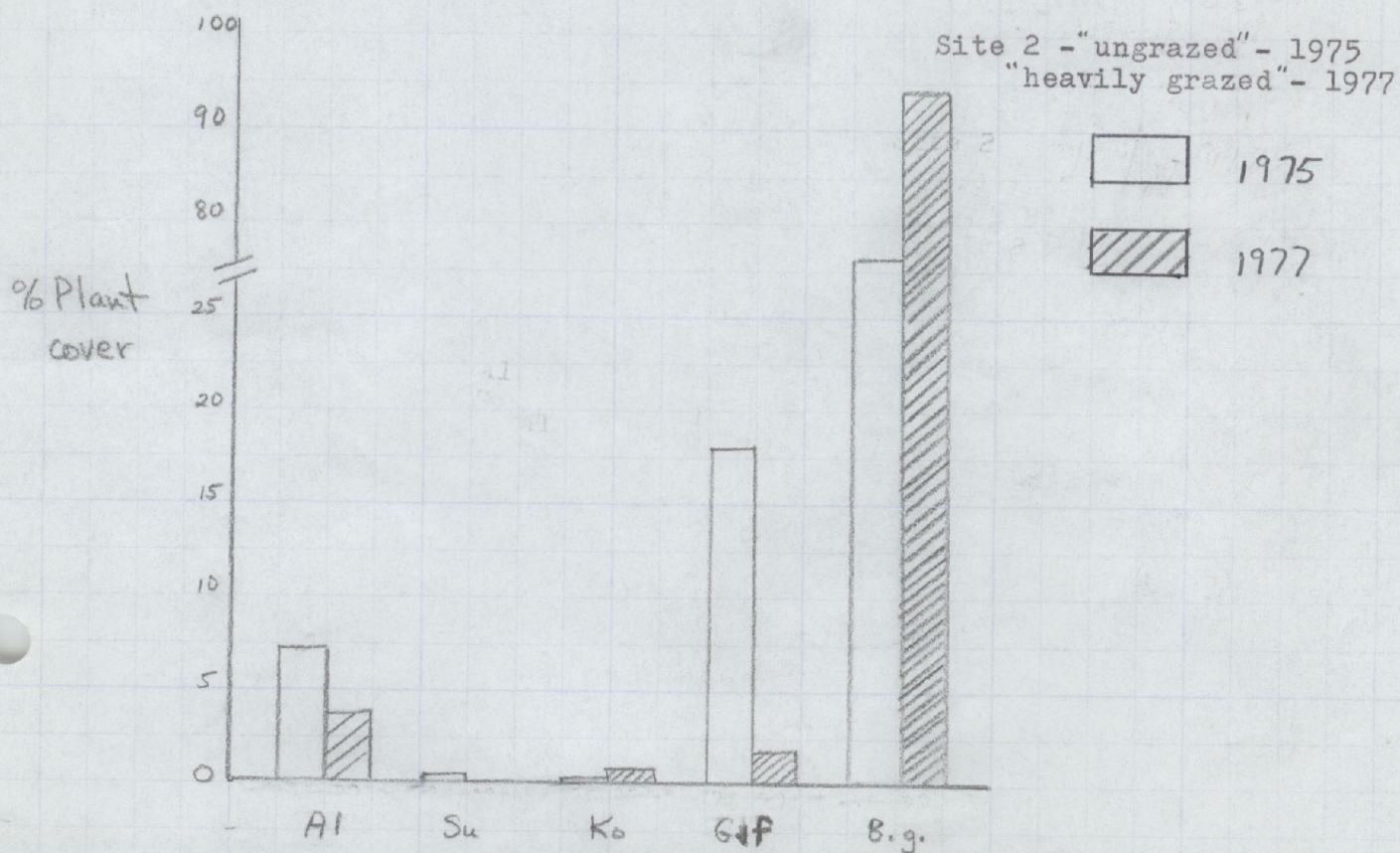
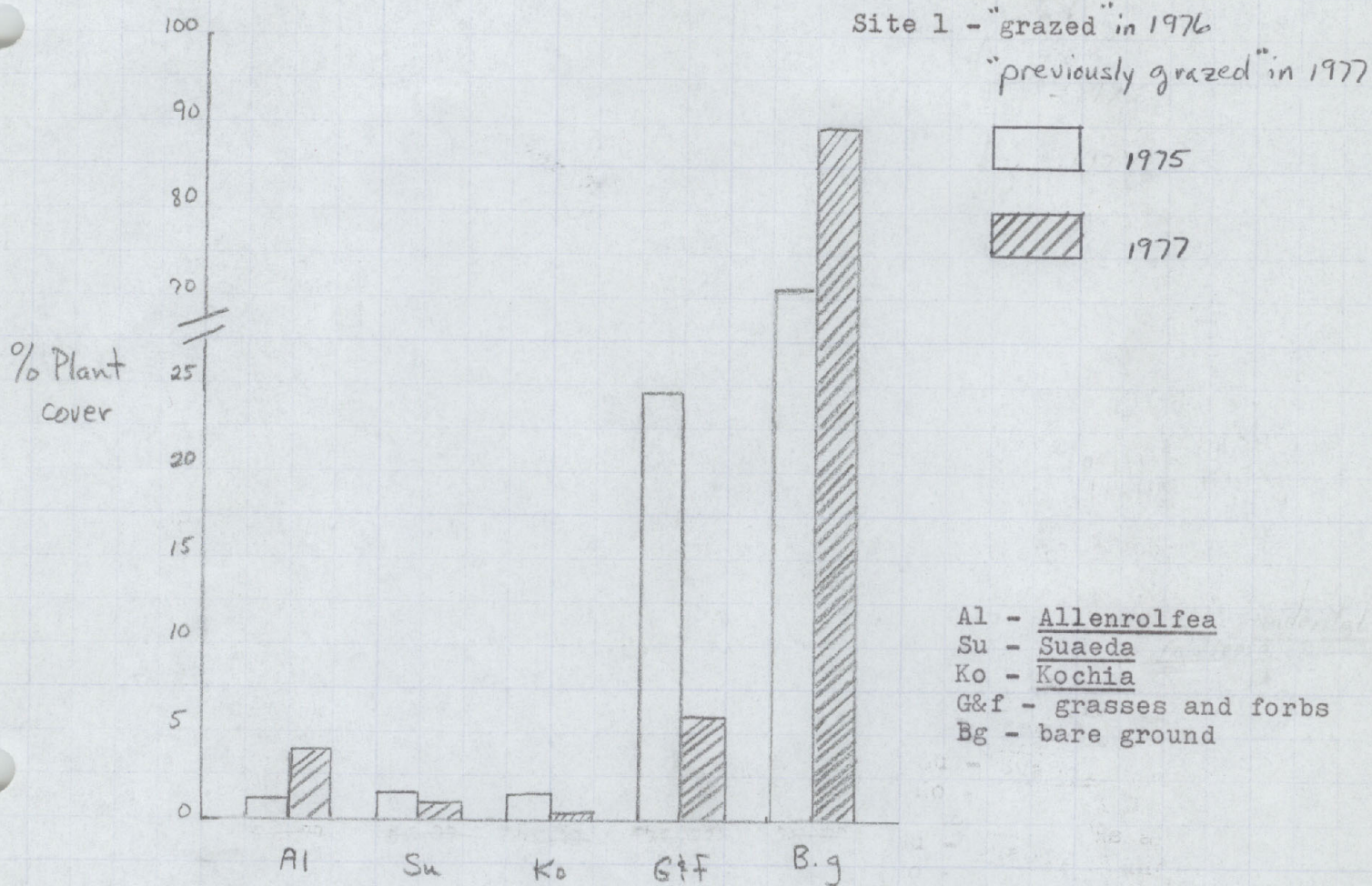
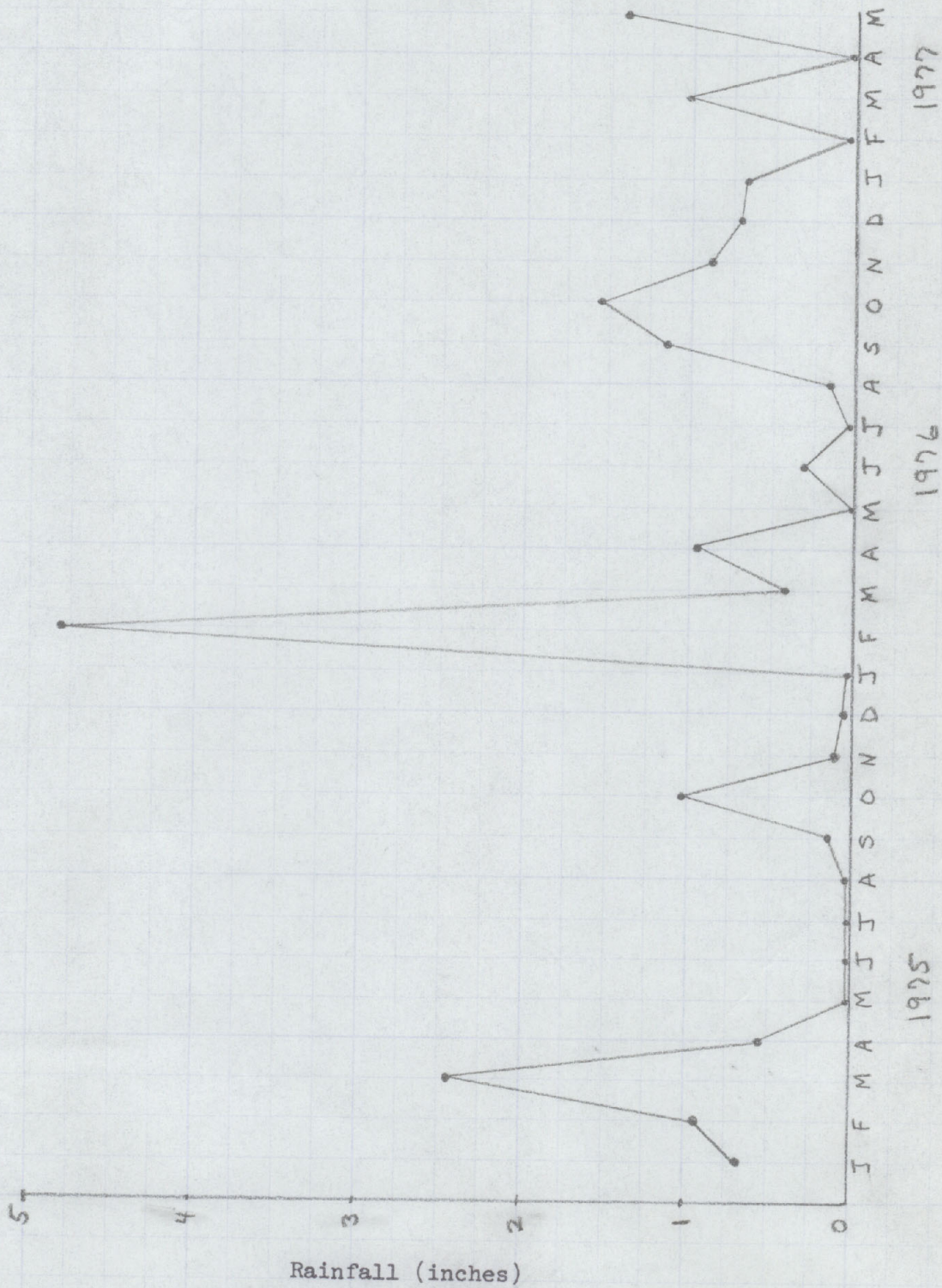


Fig. 5. Monthly rainfall for 1975, 1976 and 1977, in western Fresno County.



with less grazing pressure. By the beginning of field work in the present study, in February, 1977, 40 sheep had grazed on Site 2 for five months. This pressure remained throughout the study period. An estimated 68 Fresno kangaroo rats (4.9/ha) were on the site, reflecting a 72 percent decline from 1976. The combination of the effects of vegetation reduction through heavy grazing, and of trampling of burrow systems, probably caused the large reduction in density of kangaroo rats.

As Hoffmann (1974) noted, dense vegetation is thought to limit kangaroo rat locomotion. In a dense area, grazing might decrease the density of the vegetation and benefit kangaroo rats. However, in areas similar to the one in the present study, grazing apparently significantly reduces the area's ability to support high levels of kangaroo rats. Therefore, effective management of an alkali sink habitat for Fresno kangaroo rats depends on the elimination of grazing. The continuing conversion of native habitat to intensive agriculture is the major factor threatening the Fresno kangaroo rat. While other species of small mammals may occupy more marginal or disturbed areas, no Fresno kangaroo rats have been found on cultivated areas (Hoffmann, 1974). However, grazing by livestock also plays a significant role in reducing Fresno kangaroo rat populations.

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